

Claims

- 1 1. A method of impedance control, comprising:
2
3 providing an input/output cell having a controllable input/output impedance;
4
5 providing a reference cell including a node having a variable voltage;
6
7 comparing the voltage of the node to a reference voltage;
8
9 adjusting the voltage of the node during a defined period and according to a defined
10 procedure;
11
12 during said defined period, generating a digital signal; and
13
14 transmitting the digital signal to the input/output cell to adjust the input/output
15 impedance.
- 1 2. A method according to Claim 1, wherein:
2
3 the generating step includes the step of increasing a count value during said defined
4 period; and
5
6 the transmitting step includes the step of transmitting said count value to the input/output
7 cell after the defined period.
- 1 3. A method according to Claim 2, wherein:
2
3 the reference cell includes a series of transistors for adjusting the voltage of the node;
4 and
5

6 the adjusting step includes the step of using the count value to activate said transistors in
7 a given order to adjust the voltage of the node.

1 4. A method according to Claim 1, wherein:
2

3 the reference cell includes a first set of transistors for adjusting the voltage of the node;
4

5 the input/output cell includes a second set of transistors for adjusting the input/output
6 impedance;
7

8 each of the transistors of said first set is associated with one of the transistors in said
9 second set;
10

11 the adjusting step includes the step of activating a subset of the first set of transistors to
12 adjust the voltage of said node; and
13

14 the transmitting step includes the step of transmitting the digital signal to the
15 input/output cell to activate transistors of the second set of transistors that are associated
16 with said subset of the first set of transistors.

1 5. A method according to Claim 1, wherein:
2

3 the input/output impedance of the input/output cell varies in a defined manner as a
4 function of a given set of variables; and
5

6 the variable voltage of the node of the reference cell also varies in said defined manner
7 as a function of said given set of variables.

1 6. A method according to Claim 5, wherein:
2

3 the reference cell includes a reference resistor for establishing the variable voltage at
4 said node; and
5
6 said resistor has an impedance that varies in said defined manner as a function of said
7 given set of variables.

1 7. A method according to Claim 1, wherein the adjusting step includes the steps of:
2
3 if the voltage of the node is less than the reference voltage, then increasing the voltage of
4 the node in a first manner; and
5
6 if the voltage of the node is more than the reference voltage, then decreasing the voltage
7 of the node in a second manner.

1 8. A method according to Claim 7, wherein:
2
3 the increasing step includes the steps of
4
5 i) applying a first signal to a digital controller, and
6
7 ii) the digital controller applying a signal to the reference cell to increase the voltage
8 of the node;
9
10 the decreasing step includes the steps of
11
12 i) applying a second signal to the digital controller, and
13
14 ii) the digital controller applying a signal to the reference cell to decrease the
15 voltage of the node; and
16

17 the generating step includes the step of using the digital controller to generate the digital
18 signal.

1 9. A circuit for controlling the impedance of an input/output cell having a varying
2 input/output impedance, said circuit comprising:

3

4

5 a node having a variable voltage;

6

7 a comparator for comparing the voltage of the node to a reference voltage;

8

9 means for adjusting the voltage of the node during a defined period and according to a
10 defined procedure;

11

12 a digital generator for generating a digital signal during said defined period; and

13

14 means for transmitting the digital signal to the input/output cell to adjust the input/output
15 impedance.

1 10. A circuit according to Claim 9, wherein:

2

3 the digital generator increases a count value during said defined period; and

4

5 the transmitting means transmits said count value to the input/output cell after the
6 defined period.

1 11. A circuit according to Claim 10, wherein the adjusting means includes:

2

3 a series of transistors for adjusting the voltage of the node; and

4

5 means for using the count value to activate said transistors in a given order to adjust the
6 voltage of the node.

1 12. A circuit according to Claim 9, wherein:
2

3 the input/output cell includes a first set of transistors for adjusting the input/output
4 impedance;
5

6 the circuit further includes a second set of transistors for adjusting the voltage of the
7 node;
8

9 each of the transistors of said second set is associated with one of the transistors in said
10 first set;
11

12 the adjusting means includes means for activating a subset of the second set of
13 transistors to adjust the voltage of said node; and
14

15 the transmitting means includes means for transmitting the digital signal to the
16 input/output cell to activate transistors of the first set of transistors that are associated
17 with said subset of the second set of transistors.

1 13. A circuit according to Claim 9, wherein:
2

3 the input/output impedance of the input/output cell varies in a defined manner as a
4 function of a given set of variables; and
5

6 the variable voltage of said node also varies in said defined manner as a function of said
7 given set of variables.

1 14. A circuit according to Claim 13, wherein:

2 the circuit further includes a reference resistor for establishing the variable voltage at
3 said node; and
4
5 said resistor has an impedance that varies in said defined manner as a function of said
6 given set of variables.

1 15. A circuit according to Claim 9, wherein the adjusting means includes:
2
3 means for increasing the voltage of the node in a first manner if the voltage of the node
4 is less than the reference voltage; and
5
6 means for decreasing the voltage of the node in a second manner if the voltage of the
7 node is more than the reference voltage.

1 16. A circuit according to Claim 9, wherein said circuit is a digital controller
2 designed as a synthesized core or macro.